

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of

Amendment of the Commission's Rules with
Regard to Commercial Operations in the
3550- 3650 MHz Band

GN Docket No. 12-354

To: Marlene H. Dortch
Office of the Secretary, Federal Communications Commission

COMSEARCH COMMENTS

Christopher R. Hardy
Vice President
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, Virginia 20147

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EXECUTIVE SUMMARY

Comsearch is enthusiastic about the Commission's efforts to create a new Citizens Broadband Service in the 3.5 GHz band. We believe the lessons learned from several Commission approaches to spectrum sharing can help to inform the proposed spectrum sharing regime for this band. We also believe the need to protect incumbent federal operations while safeguarding sensitive data on these systems is the most important aspect of spectrum sharing in the 3.5 GHz band.

We believe that a database-enabled approach, such as the Spectrum Access System (SAS), is the best way to promote sharing and govern interactions in this band. We envision the SAS as a system of databases comprising a single Federal Information and Control Clearinghouse plus commercial 3.5 GHz databases.

We believe the SAS should be managed through a federally-designated manager. We think this approach will provide a way to analyze interference with federal systems while sufficiently protecting the sensitive data on these systems. This will help to maximize the utility of the 3.5 GHz spectrum by enabling operation throughout the country while providing full protection of the incumbent federal and commercial systems.

Finally, we believe the reliance on geolocation technologies is paramount in the success of the SAS. Accordingly, we believe that further study of geolocation technologies may be needed considering how the 3.5 GHz band devices may be deployed and utilized.

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COMSEARCH COMMENTS

In response to the above-mentioned *Notice of Proposed Rulemaking* (NPRM)¹,
Comsearch hereby submits the following comments.

I. INTRODUCTION

Comsearch applauds the Commission's efforts to make more spectrum available through the new Citizens Broadband Service in the 3550-3650 MHz band (3.5 GHz band). We believe that allowing new types of systems to operate in the 3.5 GHz band, with the appropriate protections for incumbent operations, presents exciting and new opportunities for the development, manufacture, and deployment of commercial broadband systems and devices. We believe the lessons learned from several Commission approaches to spectrum sharing can help to inform the proposed spectrum-sharing regime for the 3.5 GHz band. Indeed, perhaps the most important aspect of spectrum sharing in this band is the need to protect incumbent federal

¹ FCC 12-148, 27 FCC Rcd 15594, released December 12, 2012 (NPRM).

operations while safeguarding sensitive data on these systems. This is also the most challenging to solve.

II. COMSEARCH BACKGROUND

Comsearch is a leading provider of spectrum management and wireless engineering products and services to the commercial and federal market. Since 1977, Comsearch has been actively engaged with Commission, the National Telecommunications Information Administration (NTIA), and various industry groups and standards organizations to develop rules, industry recommendations, and standards that promote the efficient use of the radio spectrum. Comsearch has extensive experience working with mobile, fixed point-to-point, point-to-multipoint, and satellite systems. Our solutions focus on key areas of spectrum management including frequency planning and administration, monitoring and interference measurements, wireless engineering, and strategic consultation. Our experienced engineers, software products and information databases address the specific challenges of network design and spectrum management for the wireless industry in both the commercial and government sectors.

In addition to being an FCC-authorized TV White Space (TVWS) Database Administrator² and an FCC-certified 70-80-90 GHz Link Registration Database Administrator³, we support the American Society for Healthcare Engineering (ASHE) of the American Hospital

² See *Office of Engineering and Technology Invites Proposals from Entities Seeking to be Designated TV Band Device Database Managers*, ET Docket No. 04-186 (DA 09-2479) (Public Notice) 23 FCC Rcd 16807 (2008), and *Second Report and Order and Memorandum Opinion and Order*, (Order) ET Docket No. 04-186, ET Docket No. 02-380, 23 FCC Rcd 16807 (2008).

³ See *Allocations and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands*, WT Docket No. 02-146, 18 FCC Rcd 23318 (2003); *Wireless Telecommunications Bureau Opens Filing Window For Proposals To Develop And Manage Independent Database Of Site Registrations By Licensees In The 71-76 GHz, 81-86 GHz and 92-95 GHz Bands* (DA 04-672).

Association as the WMTS frequency coordinator⁴, and we support CTIA—The Wireless Association[®] (CTIA) in the ongoing management of the CTIA AWS Cost-sharing Clearinghouse⁵. We have developed numerous software products to address the engineering challenges of network planning, spectrum management, and spectrum administration, band sharing, incumbent relocation, and spectrum administration.

For over 35 years, Comsearch has been at the forefront of evolving spectrum management issues. Some of our pioneering efforts include:

- The earliest efforts in transitional sharing with the Personal Communications Service (PCS) where new mobile services were required to share spectrum with incumbent users before they were relocated.
- We were heavily involved with UTAM⁶ to help unlicensed PCS devices share with incumbent uses.
- We developed methods in the Advanced Wireless Service (AWS) to support transitional sharing between AWS licensees and both commercial and federal incumbents.

⁴ See *Amendment of Parts 2 and 95 of the Commission's Rules to Create a Wireless Medical Telemetry Service, "Designated the American Society for Health Care Engineering of the American Hospital Association to serve as the frequency coordinator for the Wireless Medical Telemetry Service"*, ET Docket 99-255, 16 FCC Rcd 4543 (2001).

⁵ See *Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems Service Rules for Advanced Wireless Services In the 1.7 GHz and 2.1 GHz Bands* (DA 07-1120) (ET Docket No. 00-258, WT Docket No. 02-353) (March 8, 2007) 22 FCC Rcd 4680.

⁶ UTAM, Inc. was established as a non-profit, membership corporation with members consisting primarily of equipment manufacturers wishing to develop devices to operate in the unlicensed portion of the PCS bands (1910 – 1930 MHz).

- We have been a significant contributor to TIA Bulletin TSB10-F, which details methodologies for mobile systems to share with point-to-point microwave systems.⁷
- We were the primary architects of the 70-80-90 GHz automated coordination regime where we developed the process to share data with NTIA on a real-time basis. We were also a contributing author of the coordination handbook associated with this service.
- We have developed automated processes and systems to allow spectrum sharing of point-to-point microwave links and satellite earth stations.
- Through all these efforts, we have developed extensive expertise in RF interference analysis, interference troubleshooting and measurements, and propagation modeling.

Through our Comsearch Government Solutions (CGS) division, we provide innovative engineering products and services to the DoD and other federal government and state and local agencies. Leveraging over 35 years of expertise in spectrum management, EMI/EMC analyses, Radiation Hazard and E3 field measurement of wireless technologies, we support critical government missions in the areas of national defense, public safety, and homeland security. We also have extensive experience working with the federal spectrum management databases and systems. Most of CGS staff have active security clearances.

⁷ TIA Telecommunications Systems Bulletin 10-F, “Interference Criteria for Microwave Systems,” May 1994 (TSB10-F).

III. COMMENTS

Spectrum Access System Operation

In the NPRM, the Commission describes a Spectrum Access System (SAS) in terms relative to the TVWS database and the PCAST Report as a way to govern interactions among devices in the 3.5 GHz Band.⁸ While we believe that database-enabled systems are the proper approach to promote sharing and govern interactions in this band, we also believe there are unique situations with this band that should be considered before adopting the TVWS approach *per se*.

We envision the SAS as a system of databases comprising a single Federal Information and Control Clearinghouse (Clearinghouse) plus commercial 3.5 GHz databases. We think this approach will provide a way to analyze interference with federal systems while sufficiently protecting the sensitive data on these systems. The general operation of the SAS is described below.

Both the NPRM⁹ and the NTIA Fast Track Report¹⁰ describe exclusion zones to protect incumbent systems. However, the Commission notes that the exclusion zones described in the Fast Track Report (required to protect against interference from high-power shipborne radars that could operate anywhere along all three U.S. coast lines¹¹) would preclude access to the 3.5 GHz band for approximately 60 percent of the U.S. population (approximately 190 million people)¹².

⁸ NPRM at Section C.1.

⁹ *id* at Figure 2.

¹⁰ See NTIA, *An Assessment of the Near-Term Viability of Accommodating Wireless Broadband Systems in the 1675-1710 MHz, 1755-1780 MHz, 3500-3650 MHz, 4200-4220 MHz, and 4380-4400 MHz Bands* (released October 2010) (Fast Track Report) at Tables 5-2 and 5-4.

¹¹ Atlantic, Pacific and Gulf coasts.

¹² NPRM at ¶117.

In addition, the Fast Track Report describes two types of ground-based radar systems and presents exclusion zones around systems at several locations (shown below in Figure 1).¹³

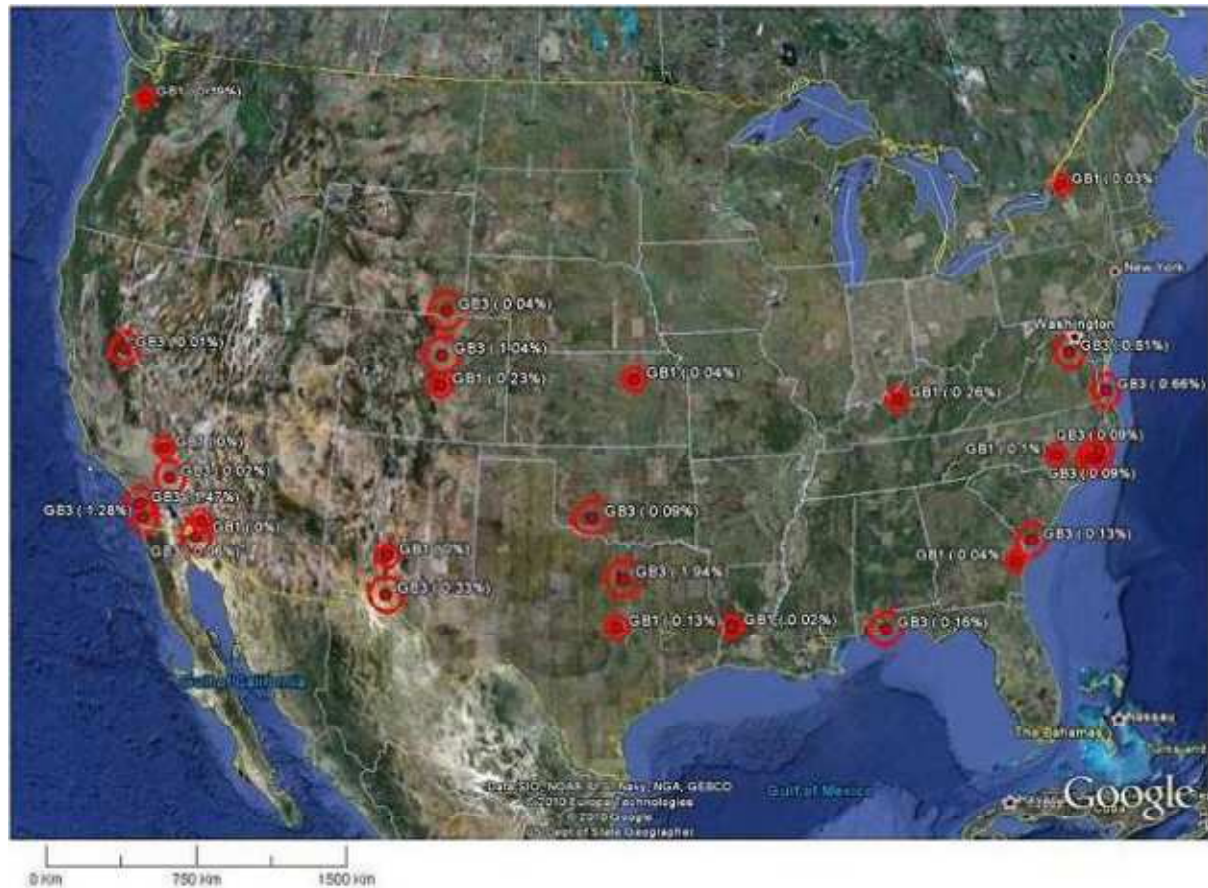


Figure 1: Exclusion Zones for Ground-based Radars from NTIA Fast Track Report

Comsearch believes a critical function of the SAS is to maximize the utility of the 3.5 GHz spectrum by enabling operation in these zones while providing full protection of the incumbent federal systems. In reality the shipborne radar operations would probably not occur continuously and simultaneously along all three coasts lines, but more likely in specific locations either in port or at sea. Therefore, it should be possible to perform near real-time analyses with these systems using more exacting analysis methodologies (e.g. multiple propagation models,

¹³ Fast Track Report at Figure 5-2.

specific C/I criteria, antenna gain discrimination, etc.) assuming their locations, movements and configurations are known.¹⁴ Figure 2 below shows a plot of the largest protection zones from the Fast Track Report¹⁵ for shipborne radars as the ships may be in port¹⁶ along with both protection zones for ground-based radars. This figure depicts how exclusion zones may be reclassified as protection zones around actual areas of shipborne operation.¹⁷



Figure 2: Plot showing largest protection zones for shipborne radars in port and for ground-based radars

¹⁴ We also suggest that it may be possible to study the sharing methodologies and issues through the Commerce Spectrum Management Advisory Committee (CSMAC) similar to the way CSMAC has been studying sharing in the 1755- 1850 MHz band.

¹⁵ Fast Track Report at Table 5-4

¹⁶ See *Technical Characteristics Of Radiolocation Systems Operating In The 3.1-3.7 GHz Band And Procedures For Assessing EMC With Fixed Earth Station Receivers*, NTIA TR-99-361, (released December, 1999)

¹⁷ We view “exclusion zones” as areas where all operation is prohibited, and “protection zones” as areas where operation may be allowed provided sufficient interference protection is accorded the subject system.

Considering that the data on these federal operations may be either classified or otherwise not publically releasable, sharing analyses with these federal systems would be performed through the Clearinghouse. The ground-based radars would also be included in this analysis. The Clearinghouse would then return the device's operating parameters (i.e., power and frequency) at the device's location that will protect the operation of the federal system. This is depicted notionally below in Figure 3.

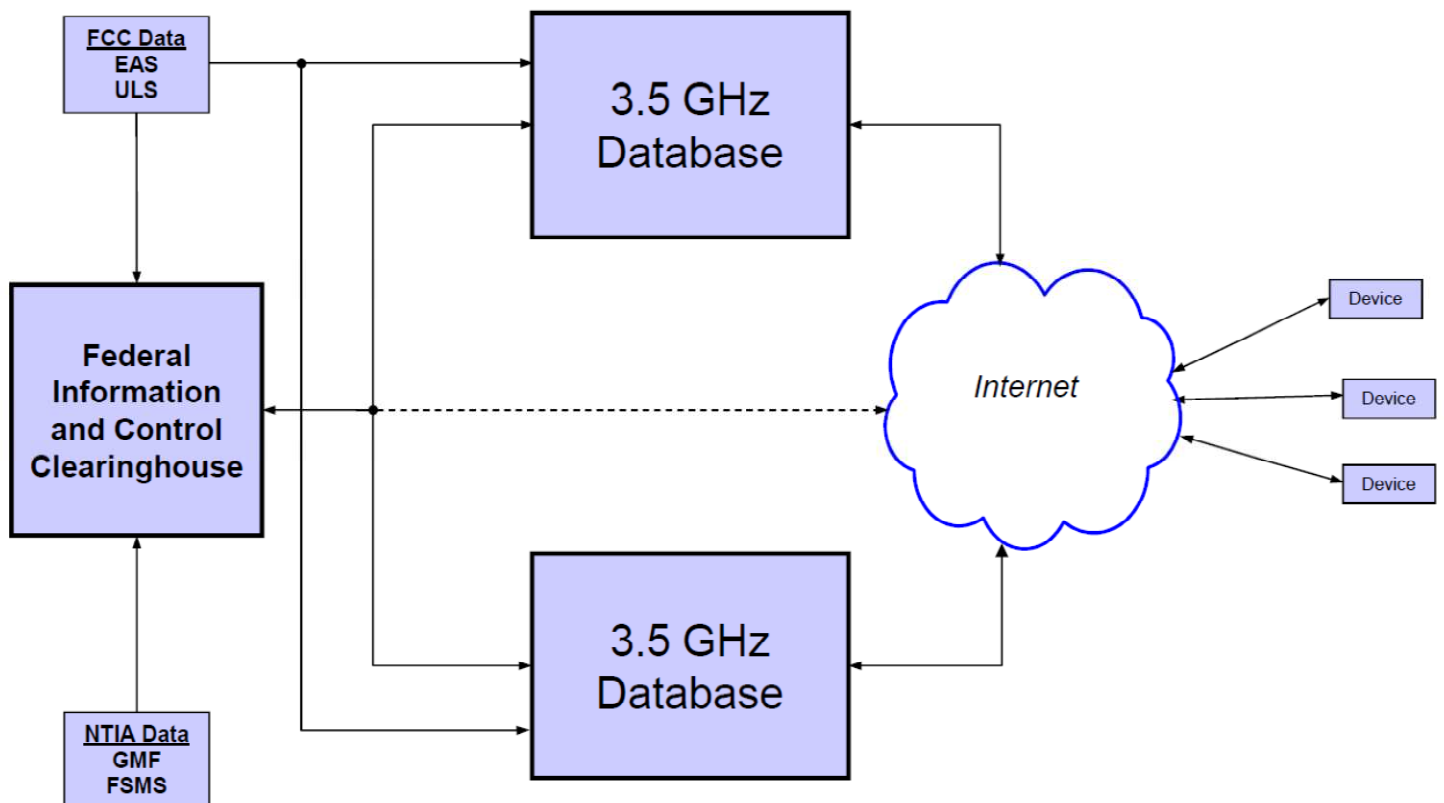


Figure 3: Notional depiction possible of SAS Architecture

Device operation anywhere outside the protection zones could be administered by the 3.5 GHz database.¹⁸ With the exception of protecting earth stations, this administration would consist mainly of providing operating frequencies between and among the Priority Access and General Access license tiers using mutually-agreed to criteria. We suggest this criteria could be developed by industry stakeholders.

However, for protection of earth stations, we suggest that it should be feasible to calculate interference into the earth station using well-established interference analysis methodology rather than employ exclusion zones.¹⁹ Much like with the federal radars, protection zones could be established around the earth stations listed in the NPRM such that device operation within the protection zones would be conditioned upon the database performing an interference calculation using the specific, licensed operating parameters of the earth station. The result would be for the database to determine the device's operating parameters. We suggest that further study is needed to determine the extent of the protection zones considering the respective types of equipment involved, actual operating parameters, and typical use cases.²⁰

The notional depiction of the SAS architecture includes interfaces from the Clearinghouse and the 3.5 GHz databases into the FCC and NTIA. As indicated, the FCC interface would be required to verify a device's FCCID and interact with the Universal Licensing System (or other Commission licensing systems as required). In addition, the FCC interface

¹⁸ The Clearinghouse could also act as a 3.5 GHz database servicing devices operating outside the protection zones. This is represented by the dotted line in Figure 3. We suggest that this concept may require further study.

¹⁹ For example, current industry-established guidelines and methods used in Part 101 frequency coordination allow sharing between terrestrial microwave and earth stations in C-band should be considered.

²⁰ NPRM at ¶124.

could be used to disable devices as needed. The interface into NTIA would be required to access frequency and equipment authorization systems as well.²¹

Spectrum Access System Administration

As mentioned above, we believe the SAS can comprise a system of multiple databases. We believe the SAS could be established through either a non-profit entity (similar to WMTS database administration) or a selected entity (similar to numbering or number portability). Indeed, the Commission, referring to the PCAST report, acknowledges this concept in the NPRM when asking whether the Commission, a commercial entity, or another federal entity should create and manage the SAS.²² Accordingly, Comsearch agrees with the PCAST and believes the SAS should be managed through either a federal entity or a federally-designated manager. We suggest the latter.

As mentioned above, the SAS Manager might come about in several ways:

- The Commission (or NTIA) could outsource the responsibility through a competitively-bid contract,
- The SAS management could be taken on by an existing industry association, or
- A new organization could be formed of 3.5 GHz stakeholders for the purpose of developing, maintaining and running the SAS (similar to UTAM).²³

²¹ We also note that the NTIA's licensing and spectrum certification systems are merging into the Federal Spectrum Management System (FSMS).

²² NPRM at ¶98, "PCAST envisions some level of federal involvement due to the need to access non-classified data and filtered classified data to facilitate spectrum sharing between federal and non-federal users."

²³ UTAM, Inc. was established as a non-profit, membership corporation with members consisting primarily of equipment manufacturers wishing to develop devices to operate in the unlicensed portion of the PCS bands (1910 – 1930 MHz).

The SAS Manager could be responsible for establishing and managing the Clearinghouse and selecting the 3.5 GHz database administrators. In addition, the SAS Manager would be required to make a statement of non-discrimination.

Basic responsibilities of the SAS Manager would include:

- Maintaining and safeguarding data on federal systems and operations,²⁴
- Analyzing interference into federal operations in real or near-real time,
- Interfacing with devices and 3.5 GHz databases to provide operating frequencies based upon queries,
- Selecting and overseeing 3.5 GHz database administrators,²⁵
- Ensuring fees are reasonable and non-discriminatory,²⁶
- Establishing a dispute resolution process.

Geolocation

Comsearch suggests that additional investigation is necessary into the geolocation requirements associated with the operation of the SAS and devices. Stakeholders must determine the specific geolocation requirements in terms of accuracy, latency and yield, and assess the capabilities of the available location technologies required and available to meet those requirements in the various expected operating environments, particularly indoors.

²⁴ We note that this may require the SAS Manager to acquire and maintain the requisite security clearances.

²⁵ We also believe that selection criteria could be established by the SAS Manager to ensure potential 3.5 GHz database administrators present the requisite capabilities to develop and maintain the database. For example, this may include a demonstration of financial ability, technical capability, and database expertise and experience.

²⁶ Establishing an SAS Manager through any of the methods described above could ensure fees are reasonable, but particularly through a non-profit.

The need to protect incumbent operations is critical, and will be based largely upon the ability of devices to geolocate. Based upon the feedback in this proceeding, the Commission may want to consider a specific investigation into geolocation technologies that can support operation of 3.5 GHz devices considering mobile, nomadic, and fixed use cases.

IV. CONCLUSIONS

We believe that allowing new types of systems to operate in the 3.5 GHz band, with the appropriate protections for incumbent operations, represents exciting and new opportunities for the development, manufacture, and deployment of commercial broadband systems and devices. Database-enabled systems are indeed the proper approach to promote sharing and govern interactions in this band using the SAS methodology discussed herein, providing sufficient protection to the incumbent operating systems while safeguarding data on the federal systems. In addition, given the expected reliance on geolocation technologies, we suggest the Commission may need to further study these technologies considering how the 3.5 GHz band devices may be deployed and utilized.

Respectfully Submitted,

/s/ Christopher R. Hardy

Christopher R. Hardy
Vice President
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, Virginia 20147

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